APHANES MICROCARPA IN THE NETHERLANDS

BY

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A few years ago I was struck by the mention in RAUNKIAER's Dansk Ekskursionsflora (1942), of *Aphanes microcarpa* (Boiss. et Reut.) Rothm. (= *Alchemilla microcarpa* Boiss. et Reut.) as occurring in Denmark, whilst in ASCHERSON and GRAEBNER, Synopsis VI (1900—1905) only Spain is mentioned. RAUNKIAER's publication led me to think of the possibility of the occurrence of this species, which strongly resembles *Aphanes arvensis* L, in the Netherlands too. It was not until early in 1950, when I came across the statement in S. M. WALTERS' article on the occurrence of *A. microcarpa* in Britain, in Watsonia (Vol.I., Part III, 1949), that this species shows a preference for acid soils, that I was induced to go further into the matter. The first corn-fields I investigated, situated on the edge of the Wychen fen, yielded it, and in the next few weeks it was copiously collected in several localities in the vicinity of Nimeguen, so that it did not seem unjustified to presume that it would occur rather frequently in the Netherlands.

A short summary of the history of the species may be inserted here. It was first distinguished by BOISSIER and REUTER (in Diagn. pl. nov. hisp.) in 1842, and described from Spanish specimens. In 1935 ROTHMALER (lit. 1) mentions it from Italy, Algeria, Morocco, Southern France, Spain, Portugal, Madeira, the Canaries, and the Azores, and from a separate area around Constantinople. In addition it is stated to occur in the Eastern United States.

In 1937 WALO KOCH (lit. 2) states the species to occur in a few places in Switzerland.

In the same year a paper was published by NYLANDER and ROTHMALER (lit. 3) from which we learn that *Aphanes microcarpa* is of very frequent occurrence in the Southern part of Sweden; it is further mentioned from Bulgaria, Czechoslovakia, Germany and Denmark (in the latter country 2 stations are known).

In 1941 GUDJONSSON publishes a paper (lit. 4) in which it is shown that in Denmark the species is as common as *A. arvensis*.

The year 1949 sees the publication of WALTERS' article, mentioned already (lit. 5), from which it is clear that in England too *A. microcarpa* is frequent.

Lastly, in 1950, A. LAWALRÉE (lit. 6) ascertains the occurrence of the species in Belgium, so far only in one locality, situated in the Campine. In all non-mediterranean countries enumerated, including ours, it had simply been taken for granted that *A. arvensis* only would

be present. As a matter of fact, the differences between the two species are not great and the small size and inconspicuousness of the plants may have played a part as well.

The main differences between the species are best seen in fruiting plants. The fruits * of *A. arvensis* are almost twice as long as those of *A. microcarpa*; WALTERS indicates for *A. microcarpa* 1.4—1.8 mm, for *A. arvensis* 2.2—2.6 mm. The calyx-teeth likewise are much longer in *A. arvensis* than in *A. microcarpa*, and as a rule distinctly spreading, the calyx is somewhat constricted beneath the teeth, so that the whole is slightly bottle-shaped, whereas the calyx-teeth in *A. microcarpa* usually converge so that the fruit shows an oval outline.

The achene too is smaller in *microcarpa* than in *arvensis*, and in addition I noticed a difference which I have not found mentioned in any of the publications consulted: the colour of the ripe achene is light, dirty yellow in *microcarpa*, but darker, brown, in *arvensis*. In the Dutch specimens examined I have not found any exception to this rule. It remains to be seen, of course, if this character will prove universally distinctive, but it seems probable to me.

Another important character may be found in the shape of the stipules enwrapping the inflorescence. As a rule these are in *A. arvensis* by no means as deeply dissected as in *A. microcarpa*; their segments are long and narrow in *microcarpa*, shorter and wider, rather triangular, in typical *arvensis* (cf. fig.). But it cannot be denied that especially *arvensis* is rather variable with regard to this character — as has been observed by GUDJONSSON too — and sometimes it closely approaches *microcarpa*. Yet the character is in most cases quite serviceable. In herbarium specimens, which, fortunately, are almost invariably collected in the fruiting stage, both species are often recognizable at a glance because of the large fruits of *arvensis* distinctly overtopping the teeth of the stipules. In *microcarpa* this is very rarely seen; in the large majority of cases the achenes are hidden between the stipules and only here and there the top of the calyx is seen protruding from amongst the segments of the stipules.

The following differential characters are less obvious.

According to NYLANDER and ROTHMALER the colour of the whole plant is greyish-green in *arvensis*, but yellowish-green in *microcarpa*. GUDJONSSON, although he has often found both species growing side by side, has failed to ascertain any conspicuous difference in colour.

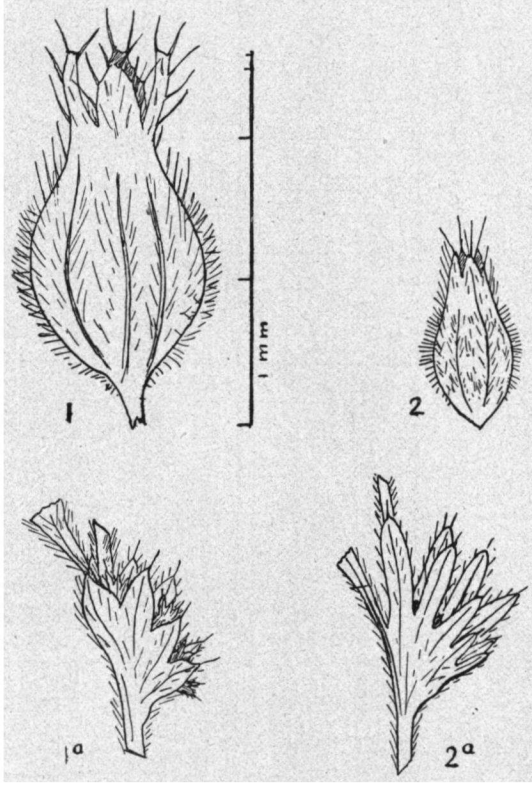
WALTERS, on the contrary, asserts that there is a slight difference in colour. As to my own experience, I can say that as a rule *microcarpa* is pure green, and *arvensis* often greyish green, but frequently it is almost impossible to ascertain any difference in colour.

If well developed plants of both species are compared side by side, it can be seen also that *A. microcarpa* is more slender than *A. arvensis*, a character which in most cases enabled me, when perusing herbarium specimens, to make at a glance a provisional separation between

* For convenience of expression the term "fruit" is used throughout the paper as denoting the body formed by the urceole, the achene and the persisting calyx.

both species, which often had been mounted together on one sheet.

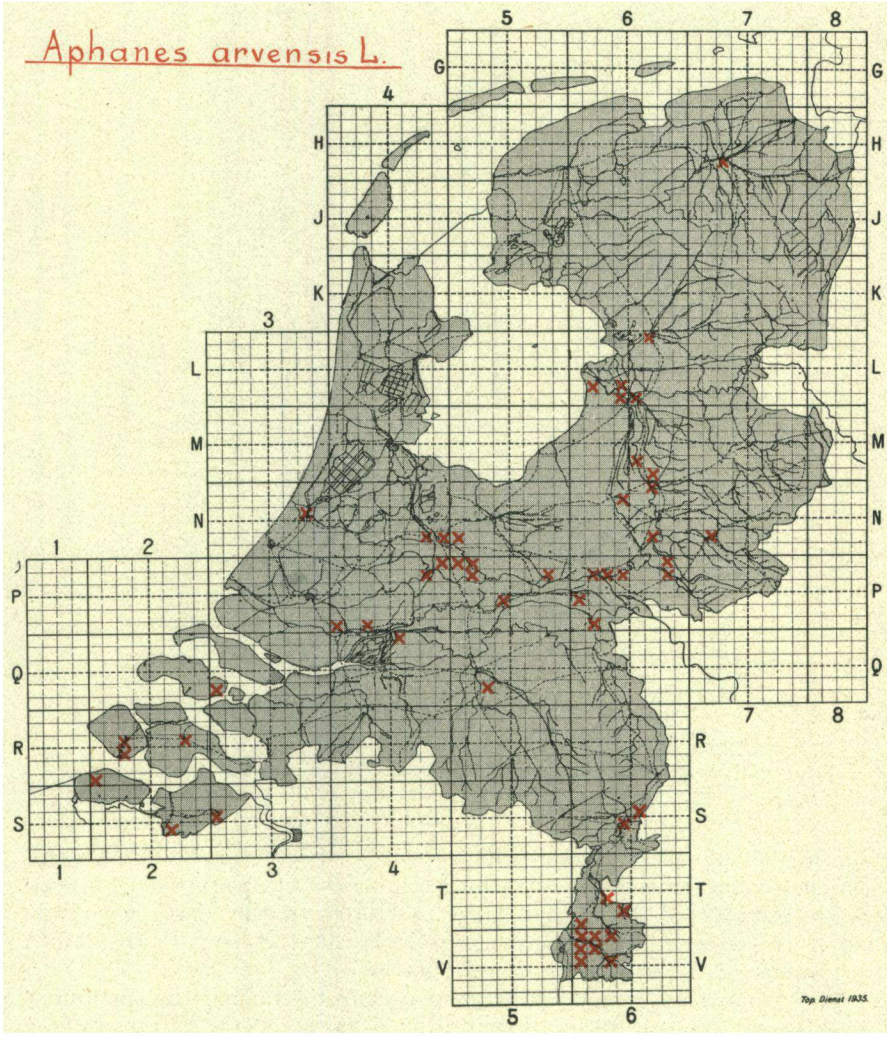
GUDJONSSON records a difference in flowering time; *A. microcarpa* flowers later than *A. arvensis*. This is in accordance with my experience; the first plants of *microcarpa* which I collected in 1950 were just be-



Fruit and fruiting inflorescence of *Aphanes arvensis* (1, 1a), as compared with those of *A. microcarpa* (2, 2a)

ginning to develop their fruits, whereas specimens of *A. arvensis*, which I collected the same day for the purpose of comparison, showed an abundance of developed fruits and later in the year, at a time when *A. arvensis* had almost completely died down, I still found specimens of *A. microcarpa* in full flower.

The conclusions which can be drawn from the herbarium specimens seen by me, relating to the distribution of both species in our country must bear a provisional character on account of the limited material available. The total number of sheets examined is 193, taken from the collections of the "Koninklijke Nederlandsche Botanische Vereeniging", the State Herbarium at Leyden, and the Universities of Amsterdam, Utrecht and Groningen, and from the private herbariums of VAN SOEST, KLOOS and KERN and REICHGELT. It appears that *A.*


Aphanes arvensis L.
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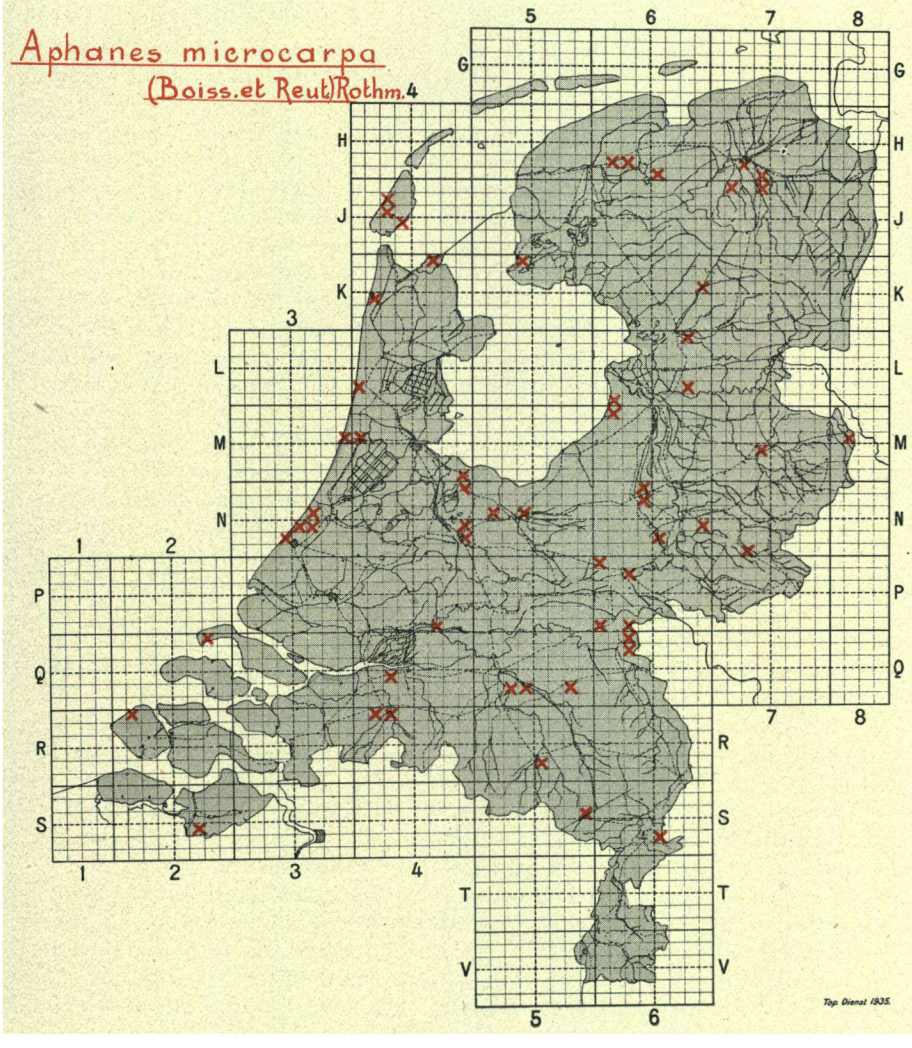
Top. Dienst 1935.


Aphanes microcarpa
(Boiss.et Reut)Rothm.4
Top. Dienst 1935.

arvensis has been collected 96 times, as against *microcarpa* 84 times, so that the former can scarcely be called a more common plant than the latter. If the number of stations is considered even the reverse seems true, viz. 52 of *arvensis* against 57 of *microcarpa*. If the stations (cf. the maps) are arranged according to the provinces it turns out that in Friesland, Drente and North-Holland *microcarpa* only has been found, whilst in the remaining 8 provinces both species occur. If arranged according to the phytogeographical districts of VAN SOEST (lit. 7) the picture becomes somewhat more distinct: in the Chalk and Loess districts only *A. arvensis* has been found; in the River and "Haff" districts this species is predominating, but in the Dune and "Wadden" districts it is probably absent.

A. microcarpa, on the contrary, is probably the only species occurring in the Dune and "Wadden" districts; it predominates in the Drente and Campine districts, and is wanting in the Chalk and Loess districts. In the Guelder and Subcentreurope districts both species occur in an equal number of stations. Although this result must be prudently handled, for the data available from certain districts are very few, it justifies nevertheless a provisional conclusion which corroborates the experiences of GUDJONSSON in Denmark and WALTERS in Britain.

Both species, which are found in the mediterranean region in heaths and steppes, do not occur here nor elsewhere in M. an N. Europe in natural vegetations; they grow in cultivated fields only.

NYLANDER and ROTHMALER were unable to ascertain a distinct difference in the Swedish habitats of both species, but GUDJONSSON did so for Denmark and concluded that *A. microcarpa* clearly dominates in the oligotrophous parts of the country, whereas *A. arvensis* is the more frequent species in the eutrophous, calcareous regions. In the transitional zones they may both occur in the same field, or be found alternatingly in different stations according to the character of the soil. GUDJONSSON relates indeed that he could predict, with very few failures, which of both species would be found in any field he happened to pass by.

WALTERS likewise concludes for Britain that his data strongly point to the probability that "*A. microcarpa* is more or less restricted to acid soils ,whilst *A. arvensis* appears to be indifferent to soil acidity". From the picture of the distribution of both species, as outlined above according to the districts of VAN SOEST, it can be said that in the Netherlands likewise *A. arvensis* predominates in the rich and often calcareous fields of the Loess, Chalk and River districts, whereas *A. microcarpa* is found mainly in the poor, often acid fields of the Drente, Campine, Dune and "Wadden" districts. Also my personal experience in the Nimeguen region agrees in the main with what has been found by GUDJONSSON.

The specimens which, according to the labels, had doubtless been collected in the Dunes, belong all to *A. microcarpa*, but all of them are of a type which slightly differs from *A. microcarpa* as found elsewhere in the Netherlands. The plants are small-leaved, and their stipules

are very short so that, in contradistinction to the plants hailing from other parts of the country, the achenes often protrude from the stipules. It seems quite possible to me that these plants from the dunes are to be considered as belonging to a separate variety, but this remains to be established until cultural experiments have taught us something on the constancy of these characters under varying conditions. In the literature accessible to me I did not find anything worth mentioning about varieties of *A. microcarpa*.

GUDJONSSON has also investigated the cytology of both species, and found for *A. microcarpa* 2n = 16, for *A. arvensis* 2n = 48, and WALTERS mentions, as the result of an examination by GUSTAFSSON in 1948, that "*A. microcarpa* is sexual and diploid with 2n = c.16, whilst *A. arvensis* is polyploid with 2n = c.48, but reproduces agamospermously".

In conclusion I may be allowed to explain why I deviate from the nomenclature so far usual in our country.

ROTHMALER, in 1935, still considers *Aphanes* a subgenus of *Alchemilla*, besides *Eualchemilla* (Focke) Buser and *Lachemilla* (Focke) Lagerh. In 1937, however, he treats these subgenera as genera, and, as a matter of fact, there are very considerable differences between *Alchemilla* and *Aphanes*. *Aphanes* has only one stamen, inserted, opposite a sepal, on the inner margin of the disk, and carrying an extrorse anther, whereas *Alchemilla* shows four stamens, alternating with the sepals, inserted on the outer margin of the disk and having introrse anthers. In addition there is a considerable difference in habit: all *Alchemilla* species are perennial and rhizomatous, all *Aphanes* species are annuals with fibrous roots only. The build of the inflorescence too is widely different. In the Scandinavian floras *Aphanes* is treated as a separate genus, and also WALTERS in Britain and LAWALRÉE in Belgium follow ROTHMALER in this respect. There seems every reason for us to conform to this practice and to reinstate *Aphanes* in its original rank.

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